50, s., 10th; 64, w., 21st; 68, w., 22d; 52, sw., 26th; 80, nw., 27th.

Other stations reporting velocities of 50 miles or more per hour are as follows: Cape Mendocino, California, 85, (estimated) se., 20th; Fort Maginnis, Montana, 62, nw., 4th; Sandusky, Ohio, 58, n., 29th; Cape Henry, Virginia, 56, nw., 29th; Buffalo, New York, 56, w., 24th; Cape May, New Jersey, 55, w. 24th; Grand Haven, Michigan, 52, nw., 23d; Indianola, Texas, 52, n. 13th; Kittyhawk, North Carolina, 50, ne., 5th.

LOCAL STORMS.

California: Cape Mendocino, 20th, a severe southeasterly gale began at 12.30 a. m., and lasted until 6.00 p. m. The wind reached a velocity of seventy-two miles an hour at 10.00 a. m., at which time the anemometer cups were blown away. It is estimated that the wind reached a velocity of eighty five miles an hour when the gale was at its height. A strong southeasterly gale was also reported on the 28th. During the 29th and 30th, a violent storm occurred; the wind blew in hurricane-like gusts, causing the office building to rattle and shake.

Connecticut: New Haven, 13th, during a severe gale that occurred in Long Island Sound, two barges and a schooner foundered; the latter vessel had all her sails blown away.

New London, 14th, a heavy gale occurred in Long Island Sound; several vessels sought shelter inside the harbor. On the 25th, during a gale, numerous vessels lost sails and sustained other damage.

Illinois: Cairo, 9th, a strong wind, accompanied by hail, (see Hailstorms), occurred about 11.30 p. m. One house was unroofed; other damage was very slight.

Iowa: 10th, during a wind storm that occurred at Rippey, Greene county, a house was blown down and completely demolished. The inmates were more or less injured.

Pennsylvania: Wellsboro, 25th, a heavy wind storm occurred at 12.30 p. m. Trees and fences were blown down, but no serious damage was done. The storm was accompanied by sleet and hail.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for November, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 88.74 per cent. The percentages for the four elements are: Weather, 87.05; direction of the wind, 89.39; temperature, 90.34; barometer, 88.18 per cent. By geographical districts, they are: For New England, 87.2; middle Atlantic states, 88.8; south Atlantic states, 92.2; east Gulf states, 89.8; west Gulf states, 87.2; lower lake region, 89.8; upper lake region, 87.3; Tennessee and the Ohio valley, 90.1; upper Mississippi valley, 88.6; Missouri valley, 86.5; north Pacific coast region, 89.1; middle Pacific coast region, 85.0; south Pacific coast region, 83.9.

There were one hundred and six omissions to predict (forty-five being due to the absence of reports from the Pacific coast), out of 3,690, or 2.87 per cent. Of the 3,584 predictions that have been made, one hundred and thirty-four or 3.74 per cent., are considered to have entirely failed; fifty-three, or 1.48 per cent., were one-fourth verified; four hundred and eight, or 11.38 per cent., were one-half verified; one hundred and five, or 2.93 per cent., were three-fourths verified; 2,884 or 80.47 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During November, 1882, one hundred and seventy-three cautionary signals were displayed. Of these, one hundred and fifty-two, or 87.84 per cent., were justified by winds of twenty-five miles per hour, at or within one hundred miles of the station. Of fourteen cautionary off-shore signals displayed, twelve, or 85.7 per cent., were fully justified; fourteen, or 100 per cent., were justified as to velocity; and twelve, or 85.7 per cent., were justified as to direction. Eight "northwest" signals were displayed, and were fully justified. One hundred and ninety-five signals of all kinds were displayed, and one hundred and seventy-two, or 88.21 per cent., were justified. These do not include signals ordered at sixty-nine display stations, where the velocity only is estimated. Two signals were ordered late.

Eighty-five winds of twenty-five miles or more per hour were reported, for which no signals were ordered; many of these were high local winds, or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The highest and lowest stages of water observed at the Signal Service stations, during the month of November, 1882, are given in the table on the right side of chart iii., In the first column of this table, the heights of water which have been found dangerous to property are given.

In the Mississippi, the highest water occurred during the latter part of the month, except at Saint Louis, Missouri, where it was observed on the 1st and 2d. The Ohio was highest at Louisville, Kentucky, on the 7th and 8th; at Pittsburg, Pennsylvania, on the 16th; and at Cincinnati, Ohio, on the 22d. The Missouri was highest at Omaha, Nebraska, on the 1st; at Yankton, Dakota, on the 9th and 10th; and at Leavenworth, Kansas, on the 16th and 17th.

HIGH TIDES.

Cape Lookout, North Carolina, 21st. Highest tide in the sound ever known at this place. The water rose in the houses on the "Banks." The tides were also high on the 20th, 22d, 28th.

Hatteras, North Carolina, 22d. Very high tide in the sound.

Eastport, Maine, 22d, 23d, 23th.

Punta Rassa, Florida, 20th.

LOW TIDES.

New York City, 25th. The strong off-shore winds of the past few days caused unusually low tides in the lower bay and in Princes Bay, and about the shores of Staten Island. Thousands of acres of Princes Bay are entirely bare. Large quantities of clams have been gathered on the south beach; and the oyster beds in Prince's and Raritan Bays are uncovered. The Staten Island ferry-boats experienced much difficulty in making landings. Robbin's Reef, Oyster Island, and Old Tom Reef, in the upper bay were entirely dry.

Indianola, Texas, 21st. Very low tide.

ICE IN RIVERS AND HARBORS.

Penobscot river: Bangor, Maine, 18th, the dead-water above the mill-dam is frozen over; all mills in the vicinity are closed for the season.

Hudson river: Albany, New York, floating ice in the river on 28th, 29th, 30th.

Erie canal: Albany, New York, 28th, canal navigation suspended on account of ice.

Maumee river: Toledo, Ohio, 30th, floating ice in the river.

Red river: Saint Vincent, Minnesota, 11th, navigation suspended on account of ice. Moorhead, Minnesota, 10th, river frozen over; 11th, the steamer "Pluck," arrived on this date, being the last boat of the season. The steamer "Alsop" is beset in the ice twenty miles south of this city. Navigation is closed for the season.

Winnepeg, Manitoba, 13th: The Red river is frozen over at this place.

Missouri river: Fort Stevenson, Dakota, 28th, river entirely closed. Fort Bennett, Dakota, 9th, ice forming in river; 13th and 23d, floating ice in river. Omaha, Nebraska, 27th, 28th, floating ice in river. Leavenworth, Kansas, 30th, slush ice in river. Fort Hale, Dakota, 29th, river frozen over. Fort Buford, Dakota, 8th, river frozen; navigation closed for season. Fort Yates, Dakota, 8th, last boat of season passed to-day.

Mississippi river: Saint Paul, Minnesota, 19th, the steamer "Grand Pacific" left this port to-day for Saint Louis, being the last boat of the season. On the 24th, 25th, and 28th, there was floating ice in the river. On the 25th, the river was frozen along its banks from twenty to fifty feet from the shore. Bur-

lington, Iowa, 22d, the last boat of the season passed this port to-day. Dubuque, Iowa, 21st, the last boat of the season departed for Saint Louis to-day; navigation closed. Keokuk, Iowa, 29th and 30th, floating ice in river. Davenport, Iowa, 22d, navigation closed for the season; the last boat passed downward on this date. The river is open and free from ice.

Tuscarawas river: Canal Dover, Ohio, 25th, ice in river reaching only a few feet from the shore. 30th, canal and river frozen over.

Lake Superior: Duluth, Minnesota, 21st, bay frozen over on the south side; tugs have difficulty in forcing passage; 30th, the steam barge "Oceola" from Detroit, whose arrival is daily expected, will be the last boat of the season. The barge "Davidson," which left this port on the 27th, was the last departure. A few tugs are still running, but navigation is practically closed for the season.

Big Horn river: Fort Custer, Montana, 12th, river frozen over.

Devil's Lake: Fort Totten, Dakota, 12th, lake partly frozen over; 23d, lake entirely frozen over.

Dakota river: Morriston, Dakota, 10th, river frozen over. Wicklow, Dakota, 25th, ice on lake from five to six inches thick.

Rock river: Rockford, Illinois, 27th, floating ice in river.

Eel river: Loagansport, Indiana, 25th, river partly frozen over.

Des Moines river: Humboldt, Iowa, 24th, river frozen over.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors, at the Signal Service stations, and the average depth at which the observations were taken, are given in the table on the right-hand of chart ii. In the first column of the table, is given, the maximum temperature observed during the month; and in the second column, the minimum temperature observed during the same period.

The table below shows the highest and lowest temperatures of water at the several stations; the range of water temperature; the mean temperature of the air at the station; and the depth of water at which the observations were taken:

Temperature of Water for November, 1882.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.		ft.	in.	
	°	°	°			°
Atlantic City, New Jersey	58.6	45.0	13.6	6	11	42.3
Alpena, Michigan	45.7	30.7	15.0	11	0	35.4
Augusta, Georgia	69.0	45.0	24.0	6	8	52.8
Baltimore, Maryland	61.0	44.0	17.0	9	9	44.3
Block Island, Rhode Island	57.5	41.2	16.3	8	6	42.7
Boston, Massachusetts	53.6	37.5	16.1	25	0	37.9
Buffalo, New York	55.0	39.0	16.0	8	0	37.7
Burlington, Vermont	54.0	44.2	9.8	17	0	35.8
Cedar Keys, Florida	76.0	49.0	27.0	8	8	61.7
Charleston, South Carolina	70.9	51.6	19.3	40	2	55.4
Chicago, Illinois	53.5	34.8	18.7	8	2	41.7
Chincoteague, Virginia	66.0	40.0	26.0	6	5	45.5
Cleveland, Ohio	56.3	40.1	16.2	14	0	40.2
Delaware Breakwater, Delaware	61.7	43.5	18.2	7	8	46.5
Detroit, Michigan	52.0	36.0	17.0	23	10	43.0
*Duluth, Minnesota	50.0	37.0	13.0	16	0	34.3
Eastport, Maine	49.1	45.1	4.0	17	0	35.7
Escanaba, Michigan	51.4	37.0	14.4	15	0	35.4
Galveston, Texas	77.0	52.0	25.0	14	10	64.1
Grand Haven, Michigan	46.5	31.0	15.5	19	0	40.4
Indianola, Texas	80.5	52.5	28.0	9	6	64.3
Jacksonville, Florida	73.0	60.0	13.0	18	0	60.0
Key West, Florida	81.3	70.0	11.3	14	1	72.9
Mackinac City, Michigan	50.0	37.5	12.5	13	0	37.3
Marquette, Michigan	44.9	35.9	9.0	10	6	35.4
Milwaukee, Wisconsin	49.5	34.6	14.9	8	0	39.8
Mobile, Alabama	73.5	55.0	18.5	14	8	58.5
New Haven, Connecticut	56.7	38.3	18.4	15	3	37.8
New London, Connecticut	61.0	42.0	19.0	12	4	40.0
Newport, Rhode Island	57.7	41.7	16.0	11	3	40.7
New York City	58.5	38.5	20.0	17	2	41.7
Norfolk, Virginia	62.0	45.0	17.0	17	6	49.1
Pensacola, Florida	76.1	56.1	20.0	17	8	59.0
Portland, Maine	50.0	38.5	11.5	19	2	39.6
Portland, Oregon	46.8	39.9	6.9	53	9	43.6
Port Eads, Louisiana	73.0	57.6	15.4	9	2	65.2
Provincetown, Massachusetts	54.0	41.0	13.0	14	0	41.6
Punta Rassa, Florida	79.6	64.6	15.0	11	8	67.1
Sandusky, Ohio	54.6	32.2	22.4	10	0	41.8
Sandy Hook, New Jersey	58.7	47.6	11.1	1	9	43.0
San Francisco, California	55.5	51.8	3.7	32	0	52.5
Savannah, Georgia	67.9	47.6	20.3	13	2	56.3
Smithville, North Carolina	69.0	50.0	19.0	10	0	51.0
Toledo, Ohio	54.5	33.9	20.6	10	7	42.0
Wilmington, North Carolina	63.5	49.0	14.5	13	0	52.2

*Observations not taken from 6th to 11th inclusive.

The largest monthly ranges are: 28° at Indianola, Texas; 27° at Cedar Keys, Florida; 26° at Chincoteague, Virginia; 25° at Galveston, Texas; 24° at Augusta, Georgia; 22° at Sandusky, Ohio; 20°.6 at Toledo, Ohio; 20°.3 at Savannah, Georgia; 20° at New York City and Pensacola, Florida. The smallest are: 3°.7 at San Francisco, California, 4° at Eastport, Maine; 6°.9 at Portland, Oregon; 9° at Marquette, Michigan; and 9°.8 at Burlington, Vermont.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were unusually frequent during the month. From the 16th to the 20th, the displays were very brilliant, and were accompanied by the most remarkable electrical disturbances that have been known for many years. Its effects upon the telegraph lines were generally felt throughout the United States. Long circuits were operated without the aid of batteries, and telegraphic and telephonic communication were seriously interrupted during its continuance. This auroral display and magnetic storm was observed and its influence felt throughout the British Isles, in British America, and in nearly all parts of the United States.

The following extract relating to this display is taken from "Nature" (a scientific journal published in London), of November 23, 1882:

"The telegraphic system of this country, has, since Friday morning last, been disturbed in a way that far exceeds anything of the kind that has ever happened before. Very powerful electric currents have been swaying backwards and forward through the crust of the earth, taking all telegraphic curcuits in the progress, and entirely stopping communication. Communication has been maintained only, where it was possible to loop together two wires, so as to avoid the use of the earth altogether. The electric storm commenced on Thursday, but it reached its climax on Friday morning (November, 17th), between 10.00 and 11.00 a. m. The currents measured over fifty milliampères, which is five times greater than the ordinary working currents. They have repeated themselves at intervals ever since, but have scarcely attained such an intensity as on Friday morning.

"Mr. Preece, whose experience in examining earth currents now extends over a period of thirty years, asserts that this storm was the most terrific he has ever observed. It was characterized on Friday by a rapid succession of alternate waves of great strength."

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The following communication by Mr. W. H. M. Christie, of the Royal Observatory, Greenwich, of date November 20th, 1882, is also taken from "Nature":

"A remarkable magnetic storm, preceded by several days of considerable magnetic disturbance, was observed here on November 17th. It commenced suddenly—November 16, 22 h. 15 m. Greenwich mean time—with a great decrease in all the magnetic elements, the declination being diminished by more than 1°, the longitudinal force by more than 1-100th part, and the vertical force by nearly 1-100th part. From 4 h. to 7 h., and also from 11 h. to 17 h., the motions were large and violent, the range exceeding 2° for the declination and 1-50th part for the horizontal and vertical force. Earth-current disturbances were also recorded, corresponding both in time and magnitude with the magnetic changes.

"In the evening, as soon as it was dark, a brilliant aurora was seen, commencing with a bright glow of red light extending from the north and west beyond the zenith, interspersed with pale green phosphorescent light and streamers. At 6 h. 4 m. a very brilliant streak of greenish light about 20° long appeared in the east-northeast, and, rising slowly, passed nearly along a parallel of declination, a little above the moon, disappearing at 6 h. 5 m. 59 s. in the west, about two minutes after it was first seen. The whole aurora had faded away by about 7 h., but it burst out again at 11 h. 45 m., when an auroral arch, with brilliant streamers reaching nearly to the zenith, was seen from north-northeast to northwest. It faded away about 12 h. 10. m.